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7
8 The invention relates to a cylindrical container after the preamble of Claim 1 as well as a
9 method and an apparatus to the production of a cylindrical container in accordance with
10 the preamble of Claim 9 and/or. 20.

11 State of the art

12
13 Cylindrical containers and methods to their production became in various embodiments
14 already known.

15 In the German Patent Laid open DE 19 36 021 a zylinderisches silo described, which
16 consists of a broad strip, becomes, which is helical wrapped, whereby those are adjacent
17 edges of the tape in each case each other after the same side angled and through rebates
18 connected with one another.

19 Silos in this embodiment can be manufactured out comparatively thin sheet, since the
20 grooving provides for a stiffener of the silo coat.

21 Meanwhile so constructed containers, for example inserted in regions of the industry,
22 become the local and industrial waste water treatment and the agriculture. In order to
23 reach a sufficient tightness of the helical longitudinal rebate, however a sealing
24 compound becomes introduced for many applications before the grooving between
25 corresponding prepared edge regions of a broad strip, which puts with the crease
26 procedure between the sheet metal parts and which joint seals.

27 Despite use of a sealing compound however the disadvantage exists that a Bekeimung of
28 the container inner wall can not be in particular avoided at the joint of the broad strip and
29 therefore for such containers the use in the drinking water range as well as in the
30 beverage industry to a large extent sealed is.

31 In the region of the beverage industry exists in this connection bspw. the problem that
32 common sealing compounds of a sterilization with z. B. Do not withstand superheated
33 steam with a temperature of 110 DEG C and/or. become detached with cleaning with a
34 high pressure cleaner.

35 Object and advantages of the invention
36

37 The invention is the basis the object to make a cylindrical container available with a
38 jacket coiled from a broad strip which permits an use in regions with comparable
39 stability, z. B. within the drinking water range or in the beverage industry, into which
40 large sterility required is.

41 This object becomes by the features of the claim 1, claim 9 and/or. the claim 20
42 dissolved. In the Unteransprüchen favourable and convenient developments of the
43 invention are indicated.

44 The invention proceeds first from a cylindrical container with a jacket, which at least
45 partly consists of a broad strip, which is helical wrapped, so that the lateral edge regions
46 of the broad strip together-border at an helical longitudinal joint. The core of the
47 invention lies now in the fact that the edge regions of the broad strip at the joint are

1 angled to a side in each case and that the broad strip is in the environment of the joint of
2 the angled edge regions welded. By this proceeding various advantages become achieved.
3 First a hundred percent tightness of the joint can become by the welding operation
4 ensured. The other one the container inner wall exhibits a surface, by which a Bekeimung
5 can be essentially excluded. Beyond that a stiffener of the outer wall of container
6 becomes achieved by the angled regions, so that comparatively thin walled sheets can be
7 begun. By the weld becomes besides the tensile strength of the jacket at the joint a
8 multiple one compared with a rebate with seal around increased. The advantages of the
9 invention can become also from the perspective viewed that by the angled edge regions a
10 weld of the joint possible will, without having to prepare the joint by pre-working, neither
11 by expensive loops nor by other time-intensive procedures the mounting of a chamfer.
12 In order to reach as gap-free an inner wall as possible, proposed becomes in the other one
13 that the edge regions broad strip to the coat exterior of the angled are and the broad strip
14 is in the environment of the joint on the coat inside welded.
15 In a particularly preferred embodiment of the invention at least an edge region of the
16 broad strip is multiple angled to the formation of a rebate. By this measure an other
17 stiffener of the outer wall of container becomes achieved.
18 Additional ones become outside edges of the angled edge regions of the broad strip with
19 the grooving covered, so that in particular a danger of injury can become avoided by
20 sharp distant edges.
21 In an other particularly advantageous embodiment of the invention an angled edge region
22 is wider as the opposite angled edge region to the formation of a rebate, whereby the
23 broader edge region embraces the narrower, opposite edge region. In this way a
24 particularly simple rebate can be realized, necessary with which becomes broad strip
25 material fewer compared with a regular used double crease significant. A "simplified"
26 rebate is such however only in the combination with the additional weld of the rebate
27 possible. Because without the additional weld a simple rebate would exhibit and could no
28 sufficient maximum stress in particular no horizontal forces take up.
29 In an other particularly advantageous embodiment for the invention the angled edge
30 regions of the broad strip are appropriate at least in the region of the first bend outward
31 viewed of the edge of sheet metal together, whereby a groove becomes formed, which is
32 welded. In this connection it is favourable in the other one, if the first bends and thus
33 those not angled portions of the broad strip with one another aligning. In this way a
34 smooth surface on the coat inside of the container, essentially uniform over the container-
35 high, can become achieved.
36 Preferably the angled regions at the first bend of approximate 90 DEG are aligned to the
37 coat wall.
38 In order to reach a rational manufacture of the outer wall of container, proposed becomes
39 in the other one that the jacket consists of a continuous broad strip.
40 With an invention process to the production of a cylindrical container with a jacket,
41 which at least partly consists of a broad strip, which is helical wrapped, so that the lateral
42 edge regions of the broad strip together-border at an helical longitudinal joint, lies the
43 core thought in the fact that opposite edge regions of the broad strip become angled to a
44 side in each case and the broad strip in the environment of the joint of the angled edge
45 regions welded becomes. Aggregates for the execution of the weld can be combined
46 thereby in advantageous manner with apparatuses, which bend the edge regions of the

1 broad strip. Such aggregates and apparatuses can be arranged for example transportable,
2 so that container z. B. with a diameter of up to 50 m at the later place of work constructed
3 to become to be able. A transport of the containers during a Werkstattfertigung would be
4 only possible on the air path, which affects negative the manufacturing costs of a
5 container.

6 In an other advantageous embodiment of the method the opposite edge regions of the
7 broad strip become first so angled that they lie one on the other. Subsequent one becomes
8 the joint in the region of a first bend of an angled edge region welded outward viewed of
9 the broad strip. To the achievement of planar an inner surface of the outer wall of
10 container over its height as possible it is in the other one preferred, if the opposite edge
11 regions of the broad strip become so welded that those not angled portions of the broad
12 strip with one another aligning. Thereby it is preferred if the weld at the coat inside made
13 and the edge regions become outward angled.

14 Around a simple rebate to obtained, it is in the other one preferred, if in a Vorfalzprozess
15 an edge region of the broad strip with one another aligning. Thereby it is preferred if the
16 weld at the coat inside made and the edge regions become outward angled.

17 Around a simple rebate to obtained, it is in the other one preferred, if becomes wide
18 angled in a Vorfalzprozess an edge region as the opposite angled edge region of the broad
19 strip.

20 In order to make for a welding operation which can be implemented a simple and exact
21 positioning possible of the edge regions to each other, proposed becomes in the other one
22 that the portion of the broader angled edge region supernatant over the narrower opposite
23 angled edge region becomes at least again in such a manner angled that a stop for the
24 outside edge of the narrower edge region develops. This represents thus a Vorfaltung,
25 which makes a simultaneous positioning assistance available for the broad strip before
26 the weld. After made weld of the broad strip at the joint of the opposite edge regions in
27 the region of a first bend the broader angled edge region can be turned over around the
28 outside edge of the opposite narrower angled edge region for the completion of the
29 rebate. Altogether the welding and crease procedure are to be understood in such a way
30 that the helical joint in a certain portion becomes finished, while in a portion located
31 before it only the Vorfaltung takes place and then the weld.

32 Alternative one is it also possible, first the opposite edge regions preferably in a portion
33 complete to folded and subsequent to accomplish the weld of this portion.

34 When bending and welding the edge regions rotatably supported preferably becomes on
35 support rollers.

36 In order to obtain with the welding procedure of the edge regions an high velocity,
37 proposed that to welding a metal active gas (LIKES) - welding process to the use comes,
38 becomes with which two wire electrodes bspw in the other one. from a wire coil supplied
39 become.

40 In order to make a rational manufacture possible on the spot one in particular large tank,
41 finally proposed become that the broad strip of a Blechrolle unwound, subsequent is
42 before-folded, welded are finished-folded and then.

43 An apparatus according to invention to production of an outer wall of container is
44 characterised by the fact that a preferably mehrsegmentige Vorfalzeinheit is, a preferably
45 mehrsegmentige finished crease unit and in the region of the finished crease unit a
46 welding unit provided. Around particularly uniform and homogeneous weld at the joint

1 of the broad strip boundary regions to obtained, becomes proposed in the other one that
2 the welding unit covers a welding stand, which is disposed between the segments of the
3 finished crease unit. In order to make possible for the resultant outer wall of container to
4 screw itself at the working stations past into the height it becomes over this proposed that
5 a scaffold is provided, on which and/or. at which the outer wall of container rotatably
6 supported which can be developed is.

7 For a simple broad strip supply finally proposed become that between Vorfalzeinheit and
8 finished crease unit a rule organ is to the control the completion and
9 Vorfalzgeschwindigkeit of the broad strip of a tape roll provided.

10 An embodiment of the invention is in the designs shown and bottom indication of other
11 advantages and details more near explained.

12 Show

13 Fig. 1 a partial finished outer wall of container of the side,

14 Fig.2 an arrangement to the production of an outer wall of container in accordance with

15 Fig. 1 in a schematic representation in plan view,

16 Fig. 3a a region of the outer wall of container in accordance with the cutout X in Fig. 1 in
17 an enlarged cut partial view shown,

18 Fig. 3b a region of the outer wall of container in accordance with one the cutout Y in Fig.
19 1 in an enlarged cut partial view shown and

20 Fig. 4a and b a rule organ for adjusting a broad strip in an enlarged schematic side view
21 and plan view shown.

22 Description of the embodiment

23
24 In Fig. 2 is an apparatus 1 to the production of an outer wall of container with partial
25 made outer wall of container 2 shown. The outer wall of container 2 consists that of a
26 broad strip 3, from a tape roll 4 unwound and by means of the apparatus 1 to the
27 production of the outer wall of container helical in accordance with Fig. 1 constructed
28 becomes.

29 In addition the broad strip 3 first into an unit 5 with Vorfalzrollen is contrived and over a
30 rule organ 6 of an unit 7 with finished crease roles and a welding unit 8 supplied.

31 The radius of curvature of the broad strip 3, becomes certain by which the later diameter
32 of the outer wall of container, can be adjusted over the Vorfalzeinheit 5 and the finished
33 crease unit of 7 by a corresponding angular adjustment their segments 9 and 10.

34 Developing the outer wall of container 2 becomes dear from a scaffold 11 with stand
35 sections 11a, disposed at the circumference, and as well as guide pulleys 12 with a
36 rotation supported and guided. The welding unit 8 covers a welding stand 13, is 14
37 disposed at which a burner element, as well as one with the outer wall of container 2 in
38 electrical connection standing sliding contact 15 to the provision of one electrical fair
39 potential and here exemplarily two welding basis stations 16, 17. The welding stand 13
40 and the finished crease unit 7 are vibrationless to the achievement uniform weld on a
41 floor plate of an established.

42 The Vorfalzeinheit 5, the rule organ 6, the finished crease unit 7 as well as the welding
43 unit 8 stand with a not represented control unit to their common control and/or control in
44 connection.

45 With the structure of an outer wall of container first a part of the broad strip 3 of the tape
46 roll 4 unwound and into the Vorfalzeinheit 5 is contrived, their segments 9 on the desired

1 radius of curvature set is. During a first full revolution of the broad strip 3, thus the
2 distance of the later outer wall of container extent, first only the upper edge of the broad
3 strip 3 of a corresponding angled region 20 viewed in structure direction becomes in
4 accordance with Fig. 3a angled. If a full revolution is achieved, both sides of the broad
5 strip 3 are before-folded, so that an upper edge region 20 and a corresponding lower edge
6 region 21 appropriate in addition develop. Because of the entrance the edge regions 20
7 and 21 are to the finished crease unit then in accordance with Fig. 3a one on the other.
8 As in Fig. 2 exemplified, is after in direction of advance of the broad strip 3 (see arrow)
9 second segment 10 of the finished crease unit 7 the welding stand 13 with burner element
10 14 positioned, around in Fig. 3a by the one on the other located edge regions 20 and 21
11 formed groove 22 with weld 23 (S. Fig. 3b) to provide. In Fig. 1 are at the outer wall of
12 container 2 the positions for in Fig. 3a and 3b of represented manufacturing conditions of
13 the edges of sheet metal of the broad strip 3 at the joint 24 by capital letters X and Y
14 symbolize.

15 After the weld of the groove 22 between the second and third segment of the finished
16 crease unit 7 the lower edge region of the broad strip 3, which became the formation of a
17 stop already rectangular angled, becomes around the leading edge 25 of the simple
18 rectangular bent upper edge region 20 of the broad strip 3 in accordance with Fig by the
19 segments 10 downstream in feed unit direction. 3b changed.

20 The thereby obtained rounded off outside edge of the rebate does not only lead to a
21 reduction of the danger of injury, but serves above all the stiffener of the outer wall of
22 container, in particular the increase of its Ringstabilität. By the mounted weld 23 the
23 tension maximum stress of the joint 24 becomes a multiple one compared with otherwise
24 conventional double crease (not shown) around raised. In the other one it becomes 22
25 possible by the weld of the groove, one as in Fig. to use 3b simplified rebate, whereby
26 compared with an otherwise conventional double crease a significant saving in material
27 can be reached. With a broad strip-wide of 500 mm for example 16% sheet material can
28 become saved compared with a double crease.

29 By the weld 23 in addition a particularly uniform surface of the inner wall of the outer
30 wall of container can be reached, which predestines the container in particular for
31 applications, in which a large sterility required is, z. B. in the beverage industry or in the
32 region of the potable water supply.

33 With the structure of the container the resultant outer wall of container 3 with
34 predetermined speed, on the basis of the stationary crease and welding fluxes, up to
35 reaching a desired outer wall of container-high screws itself from downside upward in the
36 height. The feed speed of the broad strip 3 becomes predetermined of the finished crease
37 unit, whereby the rule organ 6 regulates adjusting the broad strip 3 from the tape roll 4.
38 This procedure leaves itself simplest by the Fig. 4a and b explain. The rule organ 6 covers
39 a base plate 30, on which two sensor elements 31 and 32 fixed are. The broad strip 3
40 becomes 32 guided between the sensor elements 31 and. Becomes the outside sensor
41 element 32, z. B. a limit switch, by tape the operated, stands the drive of the
42 Vorfalzeinheit 5 and only the finished crease unit 7 is in operation. As soon as however
43 the inner sensor element 31, z. B. also a limit switch, of the sheet 3 achieved becomes,
44 connects the Vorfalzeinheit 5 again, until the broad strip 3 is adjusted into the region of
45 the outside sensor element 32.

1 With the help of this manufacturing method it is possible to develop at the later place of
2 assembly of the container the container and in particular the container wall. Because the
3 aggregates necessary to the production are transportable more executable, so that a
4 Werkstattfertigung is not compellingly necessary.

5 Reference symbol list

6 1 apparatus to the production of an outer wall of container
7 2 outer wall of container
8 3 broad strip
9 4 tape roll
10 5 Vorfalzeinheit
11 6 rule organ
12 7 finished crease unit
13 8 welding unit
14 9 segment of the Vorfalzeinheit
15 10 segment of the finished crease unit
16 11 scaffold
17 11a, 11b stand section
18 12 guide pulleys
19 13 welding stand
20 14 burner element
21 15 sliding contact
22 16 welding basis station
23 17 welding basis station
24 20 upper edge region
25 21 lower edge region
26 22 groove
27 23 weld
28 24 joint
29 25 outside edge
30 30 base plate
31 31 sensor element
32 32 sensor element